

# Mecheleciv



VOLUME 26

APRIL-1968

No. 5



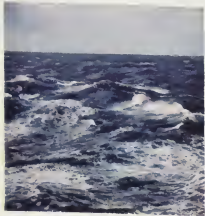
THE GEORGE WASHINGTON UNIVERSITY

APRIL 1968

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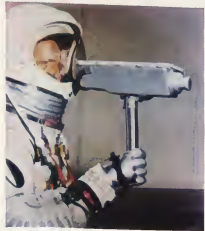
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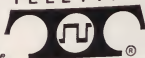
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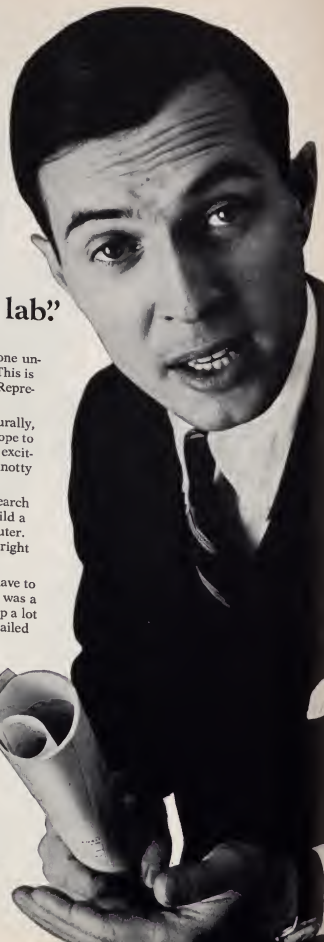
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The state of the engineering graduate schools under the new  
draft rulings.

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# MECHELECIV

## THE NEW DRAFT RULINGS

On February 15, 1968, the National Security Council sent a memorandum to the Director of Selective Service advising him to suspend occupational deferments and graduate student deferments. The suspension of occupational deferments pertains to those deferments based on the List of Essential Activities and Critical Occupations. The end of graduate student deferments will affect only those in their first year of graduate study in that those that are in their second or subsequent year of graduate study will be allowed to finish. Excluded from this are students in medicine, dentistry, veterinary medicine, and osteopathy who will be subject to special call upon completion of their training.

The suspension of occupational deferments was based on four things; viz,

1. the armed forces at this time do not require any deferments.
2. the civilian economy does not require any occupational deferment to maintain it.
3. occupational deferments are basically unfair.
4. no need for deferments since over half of these deferments are granted to men in fields not on the Lists of Critical Occupations and/or Essential Activities.

Based on the above facts, General Hershey sent a wire to all State Directors to suspend the two lists and at the discretion of each local board to grant occupational deferments based on essential community need.

Graduate student deferments were ended for those in their first year of graduate study and to those who plan to attend graduate schools after graduation with a baccalaureate degree. This implies that those in their second or higher years of graduate study will be granted deferments until they receive their degrees and then will be subject to the draft. Exceptions to these rules are those in the medical and dental fields with divinity students exempt from service by law.

Since the sequence of selection in filling quotas will remain unchanged, namely, the oldest men from the combined age group 19 through 25 will be called first. This implies that those men who have had occupational deferments and are close to 26 as well as the recent graduate with either his Masters or Ph.D. will be the first to be drafted under the new rulings. When this supply of manpower has been exhausted, the next younger men will be selected for the draft. This means that recent graduates with occupational deferments and those still in their first year of graduate study will be next in line. After this group has been exhausted, the recent baccalaureate graduate will be drafted and finally the non-college bound high school graduate or high school drop-out will be drafted.

The effects of this sequence on institutions of higher learning is tremendous, not only to enrollment but in the quality of instructors available to teach courses. This comes from the fact that teachers with their Ph.D.'s are no longer deferred for teaching on the college level and that fewer men would risk going to graduate school knowing that during the middle of the year they may be drafted. This will force many schools to fill this void of students with ones that are not as qualified as those that they want but must accept in order to stay in the black. This is conjunction with the fact that there would be fewer teachers with high qualifications to teach will lower the standards of any institution. The faculty of colleges will now be forced to admit to their ranks many who are not fully qualified to teach the courses offered at their schools but are there because these courses must be taught. This in turn cheats the undergraduate student in that he is now not able to obtain the best instructor possible and leaves him more unprepared than he otherwise may be.

Because of the above facts and on the effects of the new rulings upon both colleges and graduates, we hope that this decision would be reversed to allow for both occupational deferments in *some* critical areas and for graduate deferments to allow the engineer as well as other graduates to further their education to the fullest possible so that when they do finish, they will be able to contribute their talents for the betterment of mankind and not for its destruction. . . . .



# THE NEW DRAFT RULES AND ITS EFFECTS

In view of the recent new draft rulings concerning occupational deferments and graduate student deferments, MECHELECIV has with the permission of SCIENTIFIC ENGINEERING TECHNICAL MANPOWER COMMENTS reprinted parts of their special issue of March, 1968 concerning the new draft rulings.

In the name of fairness, the National Security Council on February 15, 1968 advised the Director of Selective Service to suspend occupational deferments based on the List of Essential Activities and Critical Occupations and to end deferment of graduate students other than those now in the second or subsequent year of graduate study. Those in medicine, dentistry, veterinary medicine, and osteopathy are already deferred. However, these men are subject to special call after completing their training, and always serve in their own discipline in officer rank.

Further, the sequence of selection in filling calls is to remain unchanged, so that the oldest men from the combined age group 19 through 25 shall be called first.

## Occupational Deferment

A memorandum to the National Security Council signed by the Secretaries of Labor, Commerce, and Health, Education and Welfare states that the needs of the civilian economy do not require deferments based on the Lists of Currently Essential Activities and Currently Critical Occupations. Because they found such deferments inherently inequitable, they recommend that draft deferments based on these lists be suspended.

They also recommend a continued surveillance over the nation's manpower needs, to identify any particular occupation or skill that may later warrant qualifying for deferment on a uniform national basis.

The National Security Council, apparently on the advice of these three cabinet officers, advised the Director of Selective Service that deferments based on the two lists should be suspended; that continuing surveillance over the nation's manpower needs should be maintained; and that if the Secretaries of Defense, Labor and Commerce identify any skill or occupation which warrants deferment, that they should notify the Council in order that the NSC may consider the need.

The Security Council stated that their recommendation is based on four considerations:

1. The needs of the Armed Forces do not now require any occupational deferments.
2. The needs of the civilian economy do not require any occupational deferments.
3. Occupational deferments are inherently inequitable.
4. There is no justification for such deferments, since more than half the actual occupational deferments that have been granted are to men in occupations not on the Lists of Critical Occupations and/or Essential Activities.

General Hershey's wire to State Directors suspends the two lists, and leaves each local board with discretion to grant, in individual cases, occupational deferments based on a showing of essential community need. "Community need" was not defined, but deferments based on community need now include sheep herders in Arizona, and the only electrician in a small town.

Since community need will presumably be considered for the community in which the registrant is working, it seems obvious that local boards may be reluctant to grant occupational deferment to men who do not work in the community in which they are registered, and that when appeals are necessary, the appeal should be transferred to the appeal board having jurisdiction over the registrant's place of employment.

## Graduate Students

Under the rules formulated in the President's Directive of last June, graduate students now in their second or subsequent years of postgraduate work may be allowed (at the option of their local boards) to continue their graduate study until they complete the next degree. For many of this year's second year graduate students, a master's degree acquired in June or August will be declared terminal, and these men will be subject to induction. Those men already past the master's level or in a program in which the Ph.D. was the earlier declared objective will generally be allowed a

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THE MECHELECIV



## Western Electric gets a fast fix on magnetics.

Anyone planning to use a magnetic material for anything more subtle than picking things up had better know its hysteresis curve. That's the curve that shows how much magnetic flux is induced in a material by applied magnetizing forces of either polarity. Western Electric uses many kinds of magnetic materials in the communications equipment we build for the Bell System. And for very subtle purposes indeed.

So we draw a lot of hysteresis curves. And, by old test methods it could take up to two hours to draw even one.

Since flux changes in many of

the materials we use produce very weak forces, people have been trying for years to work out a hysteresigraph that will get these forces to move a recording pen. Until recently, the closest anybody had come was one of our engineers.

His device employed a galvanometer, a mirror, a pair of photo-cells, a servo amplifier and motor, and an elaborate set of balancing and positioning controls. It drew nice curves, but the slightest vibration threw it off, and getting it

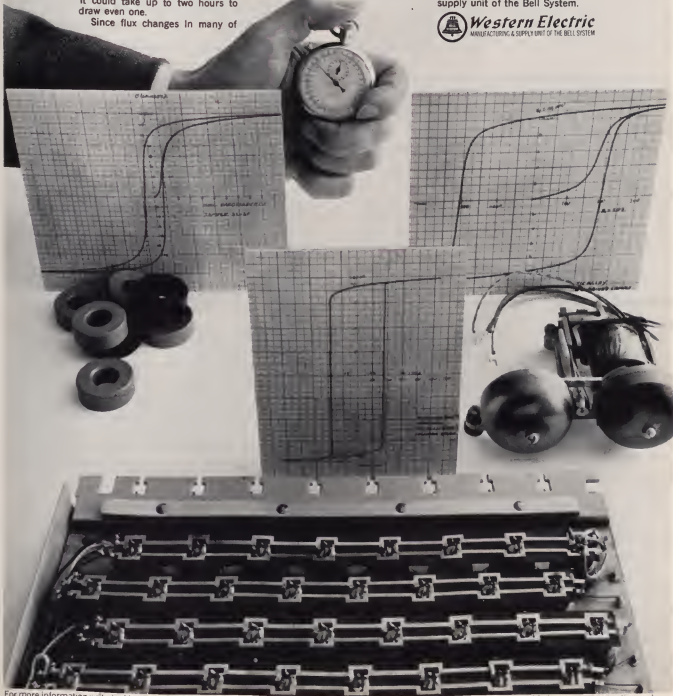
set to go again took time, skill, and infinite patience.

The same engineer who devised that hysteresigraph recognized the possibilities of a newly developed device called an electronic operational amplifier. He designed a new, all-electronic hysteresigraph around it that draws accurate curves in about five minutes, needs hardly any adjusting, and is completely indifferent to vibration.

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total of five years past the baccalaureate to complete the Ph.D.

The new ruling makes no distinction between those first year graduate students this year who are in a one-year master's program and those in a two-year program. No student now in his first year of graduate study may be deferred next year as a student. Additionally, no student completing a baccalaureate program and intending to enter graduate school may receive a deferment in class II-S.

Exceptions to these rules are the medical and dental fields; and students of divinity, who are exempt from service by law.

Men completing a Ph.D. this year who might otherwise have entered occupational deferment will be subject to the draft if they are under 26 years of age, and will of course be the first to go under the "oldest first" rule. Approximately 7,500 June, August and January 1969 Ph.D.'s are expected to be subject to immediate induction under these rules, after their degree is obtained (see page 15).

The next group to go, with an average age of 24 will be men completing a master's degree this year who are full-time students not continuing toward a Ph.D. in deferred fields, and who are not overage or veterans. This number, after subtracting those who can expect to be disqualified for physical reasons is about 23,000.

This year's first year full time graduate students who are not in the medical fields, or who are not veterans or fathers before last June, or reservists, are expected to total 89,000 men at an average age of 23 available for induction.

From the baccalaureate population, with an average age of 22 we can expect a net inductable population of 200,000. From these groups of current college students, we will then have an available total of about 320,000 qualified draftable men, age 22 through 25.

#### Who Will Be Inducted?

Under the rule of drafting oldest first, all available new Ph.D.'s will be drafted, as will all the scientists, engineers and teachers who have been deferred occupationally and who fall back into I-A; all draft-eligible new master's degree recipients; and probably all the available and qualified men who are now first year graduate students. The proportion

of the baccalaureate graduates drafted will depend on the extent of the calls.

The size of the draft calls will be determined in large part by the number of volunteers available. The number from the baccalaureate graduate group is expected by administration officials to be approximately 75,000 under the new rules — a rise of about 45,000 from the number expected under previous rules. If this number proves true, or if reservists are called up, the draft calls may be as low as 250,000 men during fiscal year 1969. A call of this size can be filled from available men age 22½ through 25. However, if fewer of the baccalaureate graduates volunteer under the pressure of the draft, the call might be as high as 350,000, which would take most of the available 22 year olds. At the anticipated call level, it seems highly unlikely that any man under age 22 would be inducted during fiscal year 1969. Those few graduates who were married before August 26, 1965, also should not be subject to the draft next year.

#### Effect on the Draftable Students

Until this time, those men completing their college work and knowing they were liable to military service generally had the option of choosing whether they wished to serve for a longer period of time as an officer or to be drafted for the minimum period and serve in the enlisted ranks. They also had the choice of enlistment in services other than the Army for longer periods of time, or of draftee service for two years. The students in general made their choices so that the military services were able to obtain about the number of officers that they needed through these options. However, under the new rules, almost the entire draftable population will have achieved one or more college degrees. The military forces will not be able to utilize a very high proportion of these men in officer programs. This may spur volunteerism for officer programs in the early months of fiscal 1969, but it will still leave the bulk of the college graduate group with no choice other than to serve as enlisted men.

For the youngest of the baccalaureate graduates — the men age 21 or just barely 22 — there may be a chance to complete a year of graduate work prior to induction. However, the student who elects to try to complete a year will be gambling, since he will have no protection from a draft notice right in the middle of a semester. The I-S(C) classification is no longer available for men who were in II-S this year and who have completed a bachelor's degree.

## Effect on the Graduate Schools

The best numbers that can be determined indicate that between 50 and 60 percent of the baccalaureate class who would ordinarily have entered full time graduate work next fall will be subject to the draft. About 62% of the current first year graduate students will be inducted, although we cannot assume that the remaining 38% will all be in graduate school, since there is a normal decline between first and second year enrollment.

Of the master's degree candidates completing a degree, including those men who were heading for a Ph.D. but whose boards will terminate their deferment on completion of the master's, about one-fourth will be drafted, and at least half the remainder will not be continuing toward a Ph.D.

The loss to individual graduate schools will vary widely. All-male institutions will, of course, be harder hit than co-educational graduate schools. Schools with a high proportion of alien students will lose smaller percentages of their classes. The highest ranking graduate schools in the nation should be able to fill up their classes, by dipping further down in the quality of applicants for acceptance, but acceptance committees will be in serious difficulty in determining the number of students they should admit in order to be sure their places are full. Certainly there will still be applications from potential graduate students who are subject to the draft. Graduate schools will have to determine how much over-commitment should be made in order to insure full classes.

For those smaller or newer graduate schools still seeking a high quality level who are not now overburdened with applicants, there will certainly be at least a 50% drop-off in both the first and second year classes of graduate study. Some schools will not be able to survive under these conditions, and the number of accredited graduate schools in the nation can be expected to fall next year rather than to rise as has been predicted in all long range educational studies prior to this draft ruling.

The effect on the undergraduate schools will be just as striking as on the graduate schools both in short and long range terms. Although universities will certainly make an effort to extend teaching assistantships to students who were previously rejected because more highly qualified applicants were thought to be available, even lowering the quality standards will not fill the teaching assistant positions needed to take care of burgeoning undergraduate enrollments. Additionally, full-time college faculty under 26 who have been deferred in II-A will be subject to

induction unless their local boards find that community hardship would result from drafting them. Almost every college and university can count on losing some of its full time staff as well as a substantial proportion of its teaching assistants.

The research efforts at universities certainly will be curtailed, but the full effect of the new draft regulations will not be felt at the research level during the coming year. Since a high proportion of research assistants may be already in their second or subsequent year of graduate study, the full effect of the blow will not fall until 1970 or 1971, when next year's first and second year classes should have reached their third and fourth years of graduate study.

## Can Anything be Done?

Many citizens and groups of citizens submitted statements to the National Security Council pointing out the necessity to find some solution other than the wholesale drafting of college graduates for serving the national need for military conscription, and offering possible solutions. The National Security Council requested recommendations from the Interagency Committee on Critical Occupations and Essential Activities, and then apparently totally ignored those recommendations.

Was it the intent of Congress that all occupational and graduate student deferment should be abolished, and that drafting should be done almost exclusively from the population of college graduates? The pertinent section of the law Congress passed provides that "the President shall, under such rules and regulations as he may prescribe, provide for the deferment of any or all categories of persons whose employment in industry, agriculture or other occupations or employment, . . . or whose activity in graduate study, research, or medical, dental, veterinary, optometric, osteopathic, scientific, pharmaceutical, chiropractic, chiropodial, or other endeavors is found to be necessary to the maintenance of the national health, safety, or interest,"

Congress may have meant to abolish deferment for these reasons, but this seems unlikely since graduate deferment and occupational deferment always have been provided for by the law under rules prescribed by the President. Occupational deferment has been available since the Revolutionary War. Even during the manpower crises of World War II, legislators were aware that deferment was essential

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# BASIC DRAFT POOL FOR FY 1969

Preinduction Pool

Draft Pool

405,000 Male Baccalaureates, 1967-68

Deduct: 55,000 Overage and Part-time  
5,000 Divinity Students  
12,000 To Grad School in Med. Fields  
10,000 Veterans  
26,000 Fathers in III-A before 6/30/67  
25% Disqual.

267,000  
67,000

200,000

144,000 First Year Full-time Grad Students, First  
Registered for Grad Study in 1967-68 School Year

Deduct: 11,000 To Grad School in Medical Fields  
6,000 Veterans  
7,000 Fathers in III-A before 6/30/67  
2,000 Reserves  
25% Disqual.

118,000  
29,000

89,000

95,000 Male Master's Degrees

Deduct: 48,000 Part-time Students Otherwise Deferred  
10,000 Continue toward Ph.D. in Med. Fields  
(These two groups also include 7,000 Veterans  
and 4,000 Fathers)  
6,000 in Reserves  
25% Disqual.

31,000  
8,000

23,000

20,000 Ph.D.'s Granted

Deduct: 10,000 Overage, Fathers, Part-time, etc.  
25% Disqual.

10,000  
2,500

7,500

College Graduate Subtotal:

319,000

1,880,000 Men Born in 1949

Deduct: 360,000 Voluntary Enlistment  
684,000 Students  
670,000 College Students  
90,000 High School Students  
51,000 In Special Schools  
Deduct: 70,000 Drop Out of School  
40,000 Part-time  
15,000 Reservists  
2,000 Fathers  
126,000 Deferred (Fathers, Agriculture, etc.)  
100,000 Rejected by L.B. without Exam  
45% Disqual.

610,000  
274,000

336,000

880,000 Men Age 20-26, Available but not Previously Drafted

Deduct: 350,000 Volunteers (During Nex 10 Months)  
220,000 Draftees (During Next 10 Months)  
Add: 30,000 From I-Y  
28,000 School Dropouts (Net)

368,000

OTHER

Add: 160,000 1948 Born who Become 19 (Net)

160,000

Add: 50,000 Earlier College Graduates from III-A

50,000

Total Draft Pool Available:

1,233,500

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# MECH MISS

## *Miss Bonnie Ursin*

Our Mech Miss for the month of April hails from nearby McLean, Virginia. Presently, a sophomore majoring in Fine Arts, Bonnie aspires to be a painter. Though she hopes to be a painter, she is very interested in the other arts, such as music, in which she is an accomplished pianist. As seen in the pictures, she loves animals, especially feeding them.







# CAMPUS NEWS



## ENGINEERS' COUNCIL

On March 25, 1968, the new Engineers' Council met with the outgoing Council in a joint meeting to familiarize the new members with Council procedure and to elect the new Council officers. The members of the new Council are

### CLASS REPRESENTATIVES

Senior Level	:	George Stellar Louis Kouts
Junior Level	:	James Bladen John Davies
Sophomore Level	:	Christopher Kouts

### SEAS REPRESENTATIVE TO THE STUDENT COUNCIL

Sandy Joel Marenberg

### SOCIETY REPRESENTATIVES PRESENT OR ANNOUNCED

Theta Tau	:	Robert Grant
ASME	:	Gurminder Bedi
IEEE	:	Lenny Sirota

The newly elected officers of the Council are

President	:	George Stellar
Vice-President	:	John Davies
Treasurer	:	Robert Grant
Secretary	:	James Bladen
Assistant Secretary	:	Louis Kouts

At the present time there are still many council positions open to interested persons. These positions are appointed by the President with the concurrence of the Council and are as follows:

Second Sophomore Level Representative  
Engineers' Open Week Chairman  
D-H House Manager  
MSE Graduate Representative  
MEA Graduate Representative

The second sophomore level representative position is open because during the elections only one person petitioned for the position. This position is to be filled by any Freshman in good standing, i.e., not on probation, that intends to be a full-time student at GW next year. The next two positions are open to any persons interested and the two graduate positions are open to any graduate students in either the MSE or MEA curriculum. If anyone is interested in any of the above positions, please leave your name and desired position in the Engineers' Council mailbox in the D-H House or talk with any Council member.

## ASME

At a recent meeting of the ASME, elections were held and the following were elected as the officers for the coming school year:

President	:	Thomas Packard
Vice President	:	Kenneth Hum
Treasurer	:	John Curtis
Secretary	:	Jack Evans
Council Rep.	:	Gurminder Bedi

ASME member Andrew S. Deming presented a paper on his electric car at the local chapter meeting and will represent the chapter at the Regional Conference as a contestant in the Student ASME paper contest. He will be accompanied by several members of the chapter for moral support and for the Conference as a whole.

## ASCE

The following officers were elected for the coming school year:

President	:	Robert Keltie
Vice-President	:	Dennis Gallino
Treasurer	:	Ellis McElroy
Secretary	:	Jack Schaeffer

## ENGINEERING ARTICLE CONTEST

The National Society of Professional Engineers, NSPE, is sponsoring a series of three cash awards for the best articles written during the academic year of 1967-68 dealing with engineering subject matter that has been or will be printed in a school publication. The cash awards of \$200-\$100-\$50 will be given to the three articles or series of articles that are considered by the judges to best reflect upon the engineering profession. The articles should deal with engineering subject matter, as distinguished from science, and can range from new developments at the school of engineering on the campus to any noteworthy topics affecting the college or surrounding areas that have engineering applications. All entries for this contest will be considered for publication in MECHELECIV, and will be forwarded to contest headquarters. For those who desire help in writing articles or in editing said articles are free to call on any member of the Editorial Board for assistance. The deadline for entries is June 10, 1968 and must be published in MECHELECIV before submission. Therefore, the deadline in our case is April 23, 1968 so that it may appear in the May issue of the magazine. For further questions, either ask one of the members of the Editorial Board, or leave a message in the MECHELECIV box in the D-H House with name and where you may be contacted.

## THETA TAU

Gamma Beta Chapter of Theta Tau Fraternity is pleased to announce its pledges for the Spring Semester, 1968:

Greg Eicheit, Freshman  
Steve Momii, Freshman  
Louis Kouts, Junior

Initiation of these men into Theta Tau is planned for the first Saturday in May with the Banquet and Ball to be held

that evening. To those Brothers who wish to attend either or both of the above events please contact

James Wong  
Joel Marenberg  
Robert Grant

with a note in the Theta Tau mailbox in the D-H House.

On April 21, 1968, Theta Tau's Second Annual Car Rally will be held. After last year's successful rally, we hope that more people will enter and enjoy the fun of rallying. There will be a nominal entrance fee which will go to prizes. There will be four categories or divisions in this rally: viz.;

1. Open—no affiliation and open to anyone who desires to rally
2. Fraternity—at least three cars from any fraternity who desires to enter as a group, one member must belong to fraternity
3. Sorority—at least three cars from any sorority who desires to enter as a group, one member must belong to sorority
4. Powderpuff—all members of car must be females.

Prizes will be presented to each member of the top ten (10) percent of the cars rallying to the Open and Powderpuff Division. A special prize will be presented to the Fraternity and Sorority Team or Teams that place in the top ten percent of their respective categories.

For further information contact

A Stacy Deming	FE 8-1985
Joel Marenberg	WH 6-5132
Douglas Jones	676-6929

HOPE TO SEE YOU AT THE RALLY. . . . .

MORE INFORMATION ON POSTERS AROUND CAMPUS

## ENTRY BLANK Θ T RALLY

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

PHONE NO. \_\_\_\_\_

REQUESTED CAR NUMBER \_\_\_\_\_

IF YOU PLAN TO RUN ON A TEAM, PLEASE INDICATE WHICH ONE \_\_\_\_\_

FILL IN AND LEAVE IN THE D-H HOUSE IN THE BOX MARKED RALLY OR USE CAMPUS MAIL. ADDRESS THETA TAU D-H HOUSE.

# CONTROL ENGINEERING IN YOUR FUTURE

*by Jim Bladen*

*Jim Bladen is a sophomore transfer student interested in electrical engineering and specifically control engineering. He has worked in the design and construction of pneumatic control circuits and hopes to become proficient in the computer sciences. As a member of the Mecheleciv staff he would like to incur the interest of prospective engineers in this field and the field of engineering in general.*

The field of engineering is opening up into the most promising source of opportunity today. Engineers of every kind are in demand, and the demand increases with each new idea and discovery. The brilliant concepts uncovered by science would be of little use to anyone without the engineer to put them to work. But the field of engineering is becoming specialized as are most of the professions, and the most promising aspect is control engineering.

The control engineer has more opportunity to discover a new concept or method than most engineers since every system he begins is previously untouched, and he may increase or decrease its sophistication within whatever design limits he chooses. He has some of the most advanced tools to work with from pneumatic, fluidic, and electric circuitry to the computer and its myriad of outcroppings. But the most interesting aspect of control engineering is the reasons for its success.

The most outstanding cause of the success of control circuits is the fallibility of man. His brain may be the most sophisticated and compact computer ever conceived, but two equivalent answers to the same question rarely emerge from two such computers, and almost as seldom do two equivalent answers come from the same computer. For this reason man must replace himself with arithmetic and logic circuits to prevent recurring mistakes and conflicts of interest.

Suppose all the factors involved in the precipitation and propagation of the Viet Nam crisis were fed into our most sophisticated computer and an equally sophisticated Russian computer. Not only would the resulting answers be identical, but if proper considerations had been incorporated in the program, then a logical resolution would no doubt emerge. But would the Russians ever agree that such

an answer was the logical explanation, and would we be content to accept the unbiased logic of the computer? Undoubtedly not, and this in part demonstrates the shortcomings of man's computer brain.

A dramatic demonstration of human oversights and conflicts is experienced by the engineers who attempt to overcome them. Errors and oversights present themselves one after another in the design of a control circuit. However, when an error is resolved or an oversight corrected these mistakes virtually cease to exist due to the machine's ability to duplicate. The mistakes may turn up again in a similar control circuit, but never again can the original error be repeated by neglect or absent-mindedness in that circuit. Most likely, elimination of the flaw will uncover many hidden errors, but with systematic elimination of these problems the circuit can far exceed the original function sought by the designer. The most valuable attribute of non-human control is then duplication.

This quality of guaranteed duplication can be exploited when new functions and operations must be incorporated in a circuit. Many problems can be solved by systematic trial-and-error manipulations, and should a new system "cycle" once, even on a hit-or-miss basis, it will hypothetically continue to cycle within the limits of the components. Thus machines which are too complicated to be controlled by humans are made functional and even inexpensable by their controls.

With the advent of new and better control circuitry men will be able to develop conveniences, machinery, and ideas which might have been dismissed as pipe dreams before the realization that control should be left to the machine and thinking to the man.



## If you want to rock the boat, it's fine with us.

It could help us to keep moving ahead. We discovered that during our pioneering years in a dynamic, young industry. It still applies today. Imaginative, inquiring minds are providing the impetus for progress in our exciting world of advanced VTOL aircraft systems.

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If you're ready to take on responsible and demanding assignments, you'll find them here in: aerodynamics • human factors engineering • automatic controls • structures engineering • weight prediction • systems analysis • opera-

tions research • reliability/maintainability engineering • autonavigation systems • computer technology • manufacturing engineering • information science • marketing... and more.

And your career advancement can be materially assisted through our corporation-financed Graduate Study Program—available at many outstanding schools within our area.

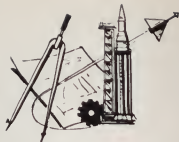
Consult your College Placement Office for campus interview dates—or—for further information, write to Mr. Leo J. Shalvoy, Professional and Technical Employment.

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# TECH NEWS



Edited by Jim Bladen

John Davies



## ELECTRONIC SHARK...

What seems to be a shark making a meal of a diver is actually a Westinghouse sonar system being lowered into a special testing pool at the Ocean Engineering and Research Center, part of the Westinghouse Underseas Division. The 15-foot-deep pool in the new laboratory, which is near the west end of the Chesapeake Bay Bridge is used in research on a wide variety of underseas equipment. The sonar shown in the photo is the Westinghouse ocean bottom scanning sonar used to produce photo-like images of the ocean bottom at any depth. It is towed by a surface ship so that it travels at a preset depth above the ocean floor. In this way, it is able to survey large areas of the bottom relatively fast. Westinghouse sonar systems similar to this unit have been used to locate the wreckage of an airliner in Lake Michigan, to survey the wreckage of an offshore oil platform downed by a hurricane, to locate the fault scarp of an earthquake off the coast of Alaska, and other underwater search and survey projects.

## SAFER JET FUEL....

By adding a small amount of an emulsifier, JP-4 jet fuel converts the liquid to a semifluid product similar to

mayonnaise. The emulsion can be pumped in normal jet turbine fuel systems, and performs as well as liquid JP-4. However, it is far less flammable than liquid fuel when spilled in an accident or crash. In a flame propagation test in which two 10-foot troughs were filled with emulsified fuel and JP-4 respectively, and ignited at one end, the flame took only two seconds to reach the opposite end of the trough filled with liquid JP-4, in contrast to almost three minutes for the emulsified fuel. This difference in the rate of flame spreading could mean the difference between a safe escape from an accident and a fiery death.

The initial phase of the research program was a search for emulsifiers which were compatible with the fuel, and which would maintain a stable emulsion under conditions of severe shock, vibration, pumping and temperature cycling. The emulsion also had to be almost ash-free, and not significantly poorer in fuel efficiency than the liquid. The emulsifier chosen as most successful from 69 tested was acetic acid salt of hydrogenated tallow amine.

The second phase of the test was determining the optimum proportion and mixing method. The most suitable mixture found was 97 per cent jet fuel with 3 percent emulsifier solution, containing 10 per cent emulsifier in half and half ethylene glycol and water.

...MONSANTO RESEARCH

## ULTRA-HIGH PERFORMANCE COMPUTER...

IBM recently announced a powerful new computer at the top of its System/360 line — the ultra-high performance Model 85. The Model 85 is designed to help solve complex scientific problems such as those encountered in space exploration, as well as meet the myriad commercial computing needs of large businesses.

The most powerful computer now offered by IBM, the Model 85 can carry out instructions at a maximum rate of 12.5-million a second. For example, it can multiply two ten-digit numbers at a rate of more than two-million

complete calculations a second — a task that would take a person using pencil and paper about 38 years of non-stop work.

Among the many innovations contributing to the Model 85's ultra-high performance are:

- A main ferrite core memory with a capacity of up to eight-million decimal digits;
- A "buffer" memory that operates in 80 billionths of a second, and
- Fast monolithic circuits.

The Model 85 can process commercial and scientific jobs separately or at the same time. In scientific work, which generally involves very large numbers, the new system offers extended precision to the equivalent of 34 decimal places — twice that available with smaller System/360 models.

#### COLOR PATTERNS ELECTRONICALLY PRODUCED ON LIQUIDS CRYSTALS...

A radically new way of converting electrical signals into colored patterns on a viewing screen has been developed at the Westinghouse Research Laboratories. It allows the screen to retain the pattern even when the current is turned off. The new technique involves a unique "liquid crystal" screen developed for use with a modified electron beam scanner.

Liquid crystals are pasty chemicals whose color usually depends on temperature. The new development resulted from the discovery that some liquid crystals can change colors in response to changing electric fields. A pattern can be reproduced by varying the intensity of an electron beam as it scans a film of liquid crystal. Video test patterns have been produced on liquid crystals, which have been recorded the patterns in hues corresponding to shades of gray in black white displays. Thus the colors of liquids crystals images are not necessarily true-to-life. Unlike phosphorescent patterns on ordinary cathode ray tubes that are best seen in darkened rooms, the liquids crystal patterns could be seen in brightly lit areas because they are viewed by light reflected from the screen.

Liquid crystals are certain organic compounds, mostly cholesterol (in the same chemical family as the blood-stream fats), that exist in a unique state of matter between the liquid and solid (crystalline) forms. The molecules, though not held rigidly in place, retain a degree of alignment. A film of liquid crystal has an iridescent color that depends upon forces affecting this alignment, such as temperature, pressure or electrostatic fields — the electronic

imaging film goes from deep red through yellow and intermediate colors to deep blue as the voltage gets higher. .

#### SPECIAL DISC BRAKES. ....

Disc brakes, no larger than the tires on a full size automobile, are providing safety for 17.5-million-pound loads of space apparatus used in NASA's Apollo moon program. The brakes were developed for use on huge tracked transporters that move Apollo space vehicles from the NASA Kennedy Space Centers vehicle assembly building to launching sites three and one-half miles away. At 32 inches in diameter, the brake discs would be considered large by normal standards; but they are relatively small, based on the size of the load they must control. The transporter weighs about 5.5 million pounds. Its cargo, an Apollo spacecraft, Saturn launch vehicle, and portable launch tower, adds another 12 million pounds; and towers more than 40 stories in the air.

Two transporters have been built for NASA. Since nothing of this magnitude had ever been developed previously, the initial vehicle was both a prototype and a production model. Its brakes had to be developed on that basis. Although the transporter and its burden move at only one mile per hour on level ground and one-half mile per hour on a 5 per cent incline, stopping almost 18 million pounds of weight in motion generates extremely high temperatures. For this reason, special alloy discs were utilized to effectively absorb and dissipate maximum kinetic energy input conditions.

A pressure-actuated service brake helps control travel speed. A "fail safe" spring-applied brake is used to stabilize the transporter while cargo is being loaded, and to serve as a parking brake. Sixteen brakes are used on each transporter and distributed evenly among four sets of corner-mounted tractor treads.

..... GOODYEAR

#### A NEW WATER DESALTING MATERIAL...

A promising new material for turning salty ocean water into the fresh, drinkable variety is under development at the Westinghouse Research Laboratories. The material, called graphitic oxide (GO), is being developed under contract with the Office of Saline Water, U.S. Department of the Interior.

Graphitic oxide is a chemical compound made from graphite, a form of carbon well known as the "lead" in a lead pencil or the black, slippery material in certain lubricants and greases. For water desalting, GO is made in the form of a thin membrane. The membrane acts as a sort of

*Continued on Page 20*



molecular sieve, allowing pure water molecules to pass through but being less permeable to the dissolved salt. This process is called reverse osmosis. Normally the direction of osmosis is from a weak solution into a more concentrated one, thus tending to dilute the stronger solution. In desalting, however, the process is reversed by applying a certain minimum amount of pressure on the more concentrated liquid causing water to flow from the more concentrated liquid (salt water or brine) to the less concentrated one (fresh water).



SUPER SWITCH

A new "switch" small enough to hold in one hand and capable of interrupting up to 12,000 amperes of current in less than a 50th of a second has been developed by the Westinghouse Electric Corporation. The new device, called a vacuum interrupter, "dumps" all this current at 15,500 volts, or nearly 150 times the voltage on the average wall switch. The vacuum interrupter is used for high-power switching of power line equipment, motor controls, radar transmitters, laser power supplies and similar applications.

The "super switch" is a rugged ceramic cylinder about six inches in diameter and eight inches long. It houses two high-purity copper electrodes, or electrical contacts, which are "yanked" open at lightening speed when tripped by excess current flow in an external magnetic coil.

The vacuum maintained in the new Westinghouse interrupter is about one-billionth of atmospheric pressure at sea level. To produce and maintain such an extreme vacuum, the gases normally trapped in the copper electrodes and other parts must be carefully boiled away and the unit perfectly sealed. Ceramic rather than glass is used as the

containing vessel since, in time, the trace of helium (0.0004 per cent) present in the atmosphere seeps through glass more readily, thus spoiling the vacuum.

During interruption, the arc formed in the vacuum interrupter consists of a hot charged vapor of copper metal, which disappears within a few thousandths of a second when collected on a metal arc shield within the device. In other interrupters, the insulating oil or gas surrounding the contacts becomes a charged vapor that cannot be dispersed as quickly, thus making continued arcing more probable and interruption of current flow less rapid.

The vacuum interrupter has the advantages of high speed, small size, simple auxiliary equipment for its operation and practically maintenance-free, long-time service. Also, since it uses a vacuum rather than oil, air, or other gas as the insulating medium, the unit is both fire and explosion proof.



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for some persons if the needs of the Armed Forces were to be supplied adequately.

Undoubtedly there will be statements sent to their Congressional representatives by industrial groups, educational institutions and by individuals who feel that the national interest is not best served by these new rulings. If Congress feels that a change in the law is needed, such legislation could be passed before June, when the full effect of these decisions will begin to be felt.

For copies of this magazine, contact the Editorial Office of the Scientific Manpower Commission and the Engineering Manpower Commission at 2101 Constitution Avenue, N.W., Washington, D. C. 20418.

In regard to the statement concerning what can be done to reverse these new rulings, we wish to note that the American Society of Civil Engineers has sent a letter to The President of the United States stating their opposition to

the new rulings. The letter from the Executive Secretary of the Society states that civil engineers in both public and private practice are engaged in activities that are essential to the maintenance of the national health, safety and interest. He goes on to state the reasons for this belief and then goes on to state his position concerning graduate student deferments. He states that an engineering student having received a bachelor's degree does not indicate that the student is now prepared to undertake engineering work.

In view of the facts and convictions presented above, we submit that it is, indeed, essential for the maintenance of the national health, safety and interest to extend student deferments for post-baccalaureate study in civil engineering. We request that the National Security Council identify civil engineering as an area of graduate study that warrants qualifying for deferment in the national interest and advise the Director of the Selective Service System accordingly.

## QUESTIONS AND ANSWERS ABOUT THE DRAFT

*If a registrant refuses to be inducted and serves a prison term, is he then free of his obligation to serve in the Armed Forces?*

No. "Any registrant who has failed or refused to report for induction shall continue to remain liable for induction and when available shall be immediately inducted."

*Since the National Security Council was given the authority to decide whether or not graduate and occupational deferments were necessary, can you give us the names of the Security Council?*

They are President Johnson, Vice President Humphrey, Secretary of State Dean Rusk, Secretary of Defense Clark Clifford, and Director of the Office of Emergency Planning Price Daniels.

*What happens to technical school students who have previously been deferred in II-A?*

Operations Bulletin No. 309 issued August 9, 1967 and amended February 26, 1968 states that "local boards may consider for Class II-A those registrants who are pursuing a full time course of study that will not lead to a baccalaureate degree. This will place such registrants in the same category as apprentices and other trainees."

*If a reservist ordered to active duty has taken a sufficient cut in salary that he cannot keep up payments on his debts, can his house, car or other possession be confiscated?*

Broad legal protection is provided for all reservists and for draftees whose ability to meet their financial obligations is impaired by military duty. The protection is contained in the Soldiers and Sailors Civil Relief Act, which applies to people in all branches of service. While the act does not require cancellation of any serviceman's debts, it prevents seizure of his assets while he is on duty.

*I am 26½ years old, have just completed my Ph.D. degree in physics, have never done anything to make me delinquent, and have just received an order to report for induction. Is this legal?*

No, your local board has made a mistake. Unless you are delinquent, you may not be ordered for induction after you are age 26 under present order of call unless all the men ahead of you in the order of call have been taken. This is highly unlikely under present conditions. Contact your local board requesting that the order be cancelled, and if they do not agree to do so, contact your State Director. If this fails to result in cancellation of the order, contact National Headquarters of Selective Service which will see that your order for induction is cancelled.

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INTEGRATED CIRCUITS  
INCANDESCENT AND FLUORESCENT LAMPS  
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## **And you still call us a phone company?**

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After all, it wasn't that long ago that we were just in the telephone business. But now, because we're involved in so much more, we need bright college graduates with practically any kind of degree, whether it's in Engineering or Commerce.

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# THE SHAFT



A preacher recently received a recommendation from his parishioners that he resign. Needless to say, he was rather bitter and so at the close of the final sermon he said: "I won't say goodbye because that's too ordinary. I won't say farewell because that's a word used when friends take leave of each other. I won't say Au revoir because I don't know what that means. But as I sashay down the aisle for the last time, I want to call your attention to the sprig of mistletoe hanging from the end of my coat-tail."

\* \* \*

The Russian school teacher asked a pupil who the first humans were.

"Adam and Eve," the kid replied.

"And what nationality were they?"

"Russian, of course," said the kid.

"And how do you know," asked the teacher.

"Easy," the kid replied. "They had no roof over their heads, no clothes to wear, and only one apple between the two of them—and they called it Paradise!"

\* \* \*

A fugitive scientist from a Boris Karloff horror picture dreamed up a serum that would bring inanimate objects to life. He surreptitiously tried it out on the statue of a great general in Central Park. Sure enough, the statue gave a quiver and a moment later the general creaking a bit in the joints, climbed down from the pedestal. The scientist was overjoyed. . . .

"I have given you life," he exulted. "Now tell me, general, what is the first thing you are going to do with it?"

"That's easy," rasped the general, ripping a gun from his holster. "I'm going to shoot about two million pigeons."

\* \* \*

He grabbed me by my slender neck  
I could not yell or scream.

He dragged me to his bedroom  
Where we could not be seen.

He threw aside my flimsy wraps  
And gazed upon my form,

I was cold and chilly

He was nice and warm.

He pressed his feverish lips to mine

I could not make him stop,

He drank my very life away—

I could not call a cop.

He made me what I am today—

Hated, used up, thrown away.

That is why you see me here—

An empty bottle of beer.

\* \* \*

"Adultery is as bad as murder. Isn't that so, Sister Brown," shouted the evangelist.

"I don't rightly know," replied Sister Brown. "I never killed anybody."

\* \* \*

A man walked into a restaurant and left the door open. A big fat man called out: "Shut the door! Were you brought up in a barn?" The man closed the door, sat down, and began

to cry. At this, the fat man looked uncomfortable and went over to the sorrowful one. Said he, "I'm sorry, I didn't intend to hurt your feelings."

"I'm not crying because you hurt my feelings," was the reply, "but the fact is, I was brought up in a barn and every time I hear an ass bray, it makes me homesick."

\* \* \*

The bank robbers arrived just before closing and promptly ordered the few remaining depositors, the tellers, clerks and guard to disrobe and lie face down, behind the counter. One nervous blonde pulled off her clothes and lay down on the floor facing upwards. "Turn over, Maybelle," whispered the girl lying beside her, "this is a stick-up, not an office party."

\* \* \*

Rules for handling women electrically:

If she talks too much—Interrupter.

If she wants to be an angel—Transformer.

If she meets you halfway—Receiver.

If she gets too excited—Controller.

If she gets up in the air—Condenser.

If she gets hungry—Feeder.

If she sings inharmoniously—Tuner.

If she is wrong—Rectifier.

If she is too fat—Reducer.

If she gossips too much—Regulator.

If she wants to get married—RESISTOR!

# SHAFTED

## AGAIN



Mother: "Why did you take so much time saying goodbye to that fellow last night?"

Daughter: "But, Mother, if a guy takes you to the movies you ought to at least let him kiss you good night."

Mother: "I thought you went to the Stork Club."

Daughter: "I did."

\* \* \*

The young husband came from the office. "What's the matter dear?" he asked his young wife. "You look upset." "Oh, it's been a dreadful day," his wife said. "First the baby cut his first tooth, then he took his first step, and then he fell and knocked out his tooth."

"Well, then what happened?" asked the young pop.

"Then, darling," cried the young wife unhappily, "then he said his first word!"

\* \* \*

When a GI saw LBJ at the airport in Viet Nam, he ran over and asked: "Aren't you President Johnson?"

"Yes."

"Man," replied the soldier. "That's what I call a draft board!"

\* \* \*

Two young sisters had been given parts in a Christmas play at school. At dinner that night they got into an argument as to who had the most important role. Jody, aged 11, was

very superior.

"Why, of course mine's the biggest part," she told five-year-old Lucy. "Anybody'll tell you it's much harder to be a virgin than an angel."

\* \* \*

Then there was the engineer who made his own drink at a party. It's called a Gin Daddy. It's made with equal parts of gin, milk, and sugar. It seems that the sugar gives you energy, the milk gives you pep, and the gin gives you ideas of what to do with all your pep and energy.

\* \* \*

A college student arrived at the Pearly Gates where St. Peter asked him who he was. When told he was a pre-med, St. Peter said, "Go to the Devil."

Some time later a pre-law student arrived, and upon being asked who he was, replied that he was a pre-law student. He was told to go to Hades.

The third student arrived at the Pearly Gates with his slide rule. When asked who he was, he replied, "I'm an engineer."

Whereupon St. Peter said: "Come on in, son. You've been through Hell already."

\* \* \*

A drunk staggered into the police station, and confessed that he had pushed his wife out of the tenth story

window.

"Did you kill her?" asked the Sgt. "I don't think so. Thash why I wanna be locked up."

\* \* \*

"Ethics," the man told his son, "is vital to everyday living. For example, today an old friend paid me back a loan with a new hundred-dollar bill. As he was leaving I discovered he'd given me two bills stuck together. Immediately a question of ethics arose: Should I tell your mother?"

\* \* \*

Beau: "So you say your big sister sent you down to entertain me until she comes down?"

12-year old: "Yes, shall we turn on the radio and shake it up, or do you want to neck?"

\* \* \*

Someone asked this C.E. why he always closed his eyes when he took a drink.

"Well, fella," he said, "the sight of good liquor makes my mouth water and I wouldn't want to dilute my drink."

\* \* \*

M.E.: "If I kiss you, will you call for Help?"

Coed: "Will you need help?" (Editor's note: It depends on the Co-ed.)

# Join a firm that'll give you executive responsibility your first day at work.



Now, that's a pretty funny thing for a civilian firm to say. A boss? Right out of college? The first day?

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As an officer in the world's largest technological organization you're a leader. Engineer. Scientist. Administrator. Right where the Space Age breakthroughs are happening.

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That could be you, too.

But you don't have to be a pilot in the Air Force to move fast. With your college degree you zip into Officer Training School, spin out an officer, speed on your way as an executive, in the forefront of modern science and technology. Right on the ground.

The Air Force moves pretty fast.

Think it over. A man's career can sometimes move pretty slow.

## United States Air Force

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## Dan Johnson has a flair for making things.

Just ask a certain family in Marrakech, Morocco.

A solar cooker he helped develop is now making life a little easier for them—in an area where electricity is practically unheard of.

The project was part of Dan's work with VITA (Volunteers for International Technical Assistance) which he helped found.

Dan's ideas have not always been so practical. Like the candlepowered boat he built at age 10.

But when Dan graduated as an electrical engineer from Cornell in 1955, it wasn't the future of candlepowered boats that brought him to General Electric. It was the variety of opportunity. He saw opportunities in more than 130 "small businesses" that make up General Electric. Together they make more than 200,000 different products.

At GE, Dan is working on the design for a remote control system for gas turbine powerplants. Some day it may enable his Moroccan friends to scrap their solar cooker.

Like Dan Johnson, you'll find opportunities at General Electric in R&D, design, production and technical marketing that match your qualifications and interests. Talk to our man when he visits your campus. Or write for career information to: General Electric Company, Room 801Z, 570 Lexington Avenue, New York, N. Y. 10022

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